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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,402	12/05/2003	Yuanhui Zhang	1201.68521	9742

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EXAMINER	
HOPKINS, ROBERT A	

ART UNIT	PAPER NUMBER
1724	

DATE MAILED: 07/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/728,402	ZHANG, YUANHUI	
	Examiner	Art Unit	
	Robert A. Hopkins	1724	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) *12-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6-27-05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Claims 12-30 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected group, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 6-27-05

Applicant's election without traverse of claims 1-12 in the reply filed on 6-27-05 is acknowledged.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-10 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Richardson(2201301).

Richardson teaches an apparatus for removing particles from a fluid comprising a separation chamber(10) having an annular tunnel to accept fluid flow, a plurality of inlet vanes(17) within the annular tunnel having a discharge angle for deflecting the fluid flow to impart a helical flow to fluid in the separation chamber, each of the plurality of inlet vanes(17) having a surface with an arced shape(figure 3; column 4 lines 56-62) such that a deflection angle of the surface of each of the plurality of inlet vanes varies

substantially smoothly from an angle at an entrance of the vanes allowing fluid flow along an axial direction as the fluid enters the vanes to the discharge angle at an exit of the inlet vanes as the fluid exits the vanes; an outlet in fluid communication with the separation chamber, the outlet configured to pass fluid having the particles removed, a collection device(24) for collecting the particles, a pressure generating device(29 in figure 11) for moving the fluid through the inlet vanes and through the separation chamber. Richardson further teaches wherein the annular tunnel is defined between an inner member(15) and an outer cylinder(10), and wherein the vanes are configured according to the equation in claim 3. Richardson further teaches wherein the annular tunnel is defined between an inner member(15) and an outer cylinder(10) and each of the plurality of inlet vanes is defined between an inner contour intersecting the inner member and an outer contour intersecting the outer cylinder, and wherein a tangential angle of both the inner contour and the outer contour varies substantially smoothly from an initial tangential angle that is parallel with the axial direction to an end tangential angle equal to the discharge angle. Richardson further teaches wherein the plurality of vanes are disposed symmetrically about the annular tunnel. Richardson further teaches wherein the plurality of vanes are formed integrally with the inner member. Richardson further teaches wherein the apparatus further comprises a plurality of particle separation modules(figure 1), each of the particle separation modules including the separation chamber having the annular tunnel and the plurality of inlet vanes. Richardson further teaches wherein the outlet comprises a plurality of individual fluid outlets in fluid communication with the separation chamber of each of the plurality of particle

separation modules. Richardson further teaches wherein the plurality of particle separation modules is formed into a casing(figure 1). Richardson further teaches wherein the modules are arranged in an array.

Claims 1-6 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Johnson(2847087).

Johnson teaches an apparatus for removing particles from a fluid comprising a separation chamber(17) having an annular tunnel to accept fluid flow, a plurality of inlet vanes(25) within the annular tunnel having a discharge angle for deflecting the fluid flow to impart a helical flow to fluid in the separation chamber, each of the plurality of inlet vanes(25) having a surface with an arced shape(figure 3; column 3 lines 25-31) such that a deflection angle of the surface of each of the plurality of inlet vanes varies substantially smoothly from an angle at an entrance of the vanes allowing fluid flow along an axial direction as the fluid enters the vanes to the discharge angle at an exit of the inlet vanes as the fluid exits the vanes; an outlet in fluid communication with the separation chamber, the outlet configured to pass fluid having the particles removed, a collection device(16) for collecting the particles, a pressure generating device(fan not shown; column 3 lines 9-10) for moving the fluid through the inlet vanes and through the separation chamber. Johnson further teaches wherein the annular tunnel is defined between an inner member(24) and an outer cylinder(17), and wherein the vanes are configured according to the equation in claim 3. Johnson further teaches wherein the annular tunnel is defined between an inner member(24) and an outer cylinder(17) and each of the plurality of inlet vanes is defined between an inner contour intersecting the

inner member and an outer contour intersecting the outer cylinder, and wherein a tangential angle of both the inner contour and the outer contour varies substantially smoothly from an initial tangential angle that is parallel with the axial direction to an end tangential angle equal to the discharge angle. Johnson further teaches wherein the plurality of vanes are disposed symmetrically about the annular tunnel. Johnson further teaches wherein the plurality of vanes are formed integrally with the inner member.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Armstrong teaches a reverse cyclone separator having a plurality of inlet vanes which impart a helical flow to an inlet fluid, wherein each inlet vane has an arced shape.

Allowable Subject Matter

Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 11 recites "wherein the apparatus further comprises at least one multi-annular particle separation module having a plurality of the annular tunnels arranged concentrically , each of the plurality of the annular tunnels including a plurality of the inlet vanes". Richardson teaches a multi-annular particle separation module, however the plurality of annular tunnels are not arranged concentrically. It would not have been obvious to someone of ordinary skill in the art at the time of the invention to provide at least one multi-annular particle separation module having a plurality of the annular

tunnels arranged concentrically , each of the plurality of the annular tunnels including a plurality of the inlet vanes because Richardson does not suggest such a modification.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert A. Hopkins whose telephone number is 571-272-1159. The examiner can normally be reached on Monday-Friday, 7am-4pm, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ROBERT A. HOPKINS
PRIMARY EXAMINER

Rah
July 27, 2005